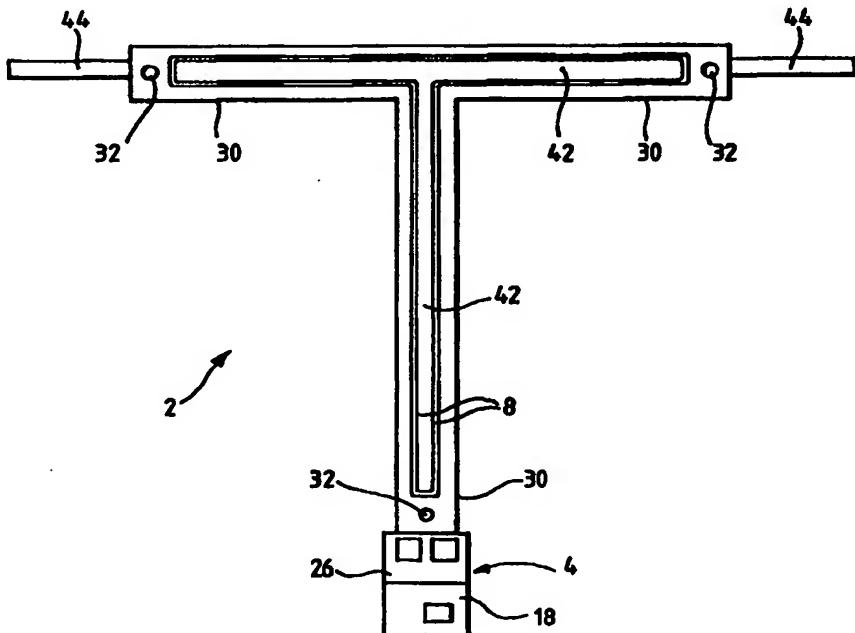




## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<p>(21) International Application Number: PCT/GB98/00816</p> <p>(22) International Filing Date: 18 March 1998 (18.03.98)</p> <p>(30) Priority Data: 9705690.7 19 March 1997 (19.03.97) GB</p> <p>(71) Applicant (for all designated States except US): MINIFLAME LIMITED [GB/GB]; Selectron House, Springhead Enterprise Park, Gravesend, Kent DA11 8HD (GB).</p> <p>(72) Inventors; and</p> <p>(75) Inventors/Applicants (for US only): WATSON, Peter, Matthew [GB/GB]; Reynolds Farm, Luddesdown, Gravesend, Kent DA13 0XB (GB). HUCK, Lennox, Mark [GB/GB]; 30 Linden Road, Gillingham, Kent ME7 2PH (GB).</p> <p>(74) Agent: JONES, Graham, Henry; Graham Jones &amp; Company, 77 Beaconsfield Road, Blackheath, London SE3 7LG (GB).</p>		<p>(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, GW, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).</p> <p>Published With international search report.</p>

(54) Title: PORTABLE ELECTROLUMINESCENT HELICOPTER LANDING PAD



## (57) Abstract

Apparatus (2) for helping a helicopter to land, comprising a bag (4) containing a packed helicopter landing pad (6). The packed helicopter landing pad (6) is able to be unpacked on the ground to show a helicopter pilot where to land. The helicopter landing pad (6) is such that it comprises a flexible strip of electroluminescent material (8) which becomes illuminated consequent upon receiving an electrical current from a power source thereby to enable the helicopter pilot to see the helicopter pad (6) in conditions of poor visibility.

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## PORTABLE ELECTROLUMINESCENT HELICOPTER LANDING PAD

This invention relates to apparatus for helping a helicopter to land.

Helicopters have problems in landing in strange areas in conditions of poor visibility. For example, a helicopter may be called out in an emergency and it may have to land to pick up or set down a person on rough terrain at night. The landing spot is often not illuminated or it is only able to be illuminated by lights from cars, torches, flares or the like.

It is an aim of the present invention to reduce the above mentioned problem.

Accordingly, in one non-limiting embodiment of the present invention there is provided apparatus for helping a helicopter to land, which apparatus comprises a bag containing a packed helicopter landing pad, the packed helicopter landing pad being such that it is able to be unpacked on the ground to show a helicopter pilot where to land, and the helicopter landing pad being such that it comprises a flexible strip of electroluminescent material which becomes illuminated consequent upon receiving an electrical current from a power source thereby to enable the

helicopter pilot to see the helicopter landing pad in conditions of poor visibility.

The apparatus of the present invention is advantageous in that the helicopter pilot is able to see the landing pad in conditions where the pilot might otherwise have trouble landing the helicopter in safety. The conditions of poor visibility will usually be at night but they may also be at dusk or in fog or mist. The strip of electroluminescent material is able to become illuminated to provide the required visibility. The strip of electroluminescent material is robust in use and it is unlikely to become broken, even if the apparatus is thrown from a helicopter in the air to persons on the ground so that the persons on the ground can unpack the helicopter landing pad. Because the strip of electroluminescent material is flexible, it is easily rolled, folded or bent as may be required for packing and unpacking.

The apparatus of the invention will usually include securing means for securing the helicopter landing pad to the ground during use of the apparatus. The helicopter will generate a lot of air turbulence and it is therefore an advantage to have securing means for ensuring that the unfolded helicopter landing pad stays in position during landing of the helicopter.

The securing means is preferably a mallet and pegs. The pegs may be in the form of tent pegs or they may be in the form of spikes. Generally, any suitable and appropriate securing means may be employed.

Preferably, the flexible strip of electroluminescent material is of substantially circular cross sectional shape.

The flexible strip of the electroluminescent material may comprise a first electrode which is a centrally positioned longitudinally extending electrode, and a second electrode which is a helically wound electrode. The first and the second electrodes may be separated by a phosphor coating with a metallic sheath. The second electrode may be surrounded by a sheath of an indium tin oxide. The first electrode is preferably a copper wire electrode. The second electrode is preferably a fine wire electrode.

The flexible strip of the electroluminescent material preferably comprises an outer plastics layer. The outer plastics layer is preferably made of polyvinyl chloride but other plastics materials may be employed.

The apparatus may include an electronic circuit for causing the strip of electroluminescent material to emit a continuous light. Alternatively, the

apparatus may include an electronic circuit for causing the strip of electroluminescent material to emit a pulsating light. The electronic circuit emitting the pulsating light may include timer means for causing the pulsating light.

The apparatus will usually be one in which the power source is at least one battery, and in which the apparatus includes an inverter for providing power for the electroluminescent material from the battery.

The apparatus may be one in which the strip of electroluminescent material extends substantially the entire length and width of the helicopter landing pad.

The strip of electroluminescent material may be in the shape of a known helicopter landing pad sign. Thus, for example, the helicopter landing pad sign may be a T, H, X or diamond shaped sign.

The helicopter landing pad may be in roll form or folded form in its packed condition. Generally, the helicopter landing pad can be packed and unpacked in any suitable and appropriate manner.

The flexible strip will usually be mounted on a flexible substrate material. The flexible substrate material may be canvas or a plastics material. Any suitable and appropriate type of plastics material may be employed.

The apparatus may be one in which the bag comprises a body portion for the helicopter landing pad, and a carrying portion by which the bag is carried.

The bag may include a battery pouch for the power source in the form of a battery or batteries. The battery pouch is preferably formed as an integral part of the inside of the body portion of the bag.

The apparatus may be one in which the bag is in the form of a holdall. Other types of bag can be employed. Generally, the bag can be of any suitable and appropriate size, shape and construction. The bag may be made from canvas or a plastics material.

Embodiments of the invention will now be described solely by way of example and with reference to the accompanying drawings in which:

Figure 1 shows first apparatus of the invention with a packed helicopter landing pad partially unpacked;

Figure 2 shows the helicopter landing pad of Figure 1 and fully unpacked;

Figure 3 shows second apparatus of the invention with a completely unpacked helicopter landing pad;

Figures 4, 5 and 6 show a packing sequence for packing the unpacked helicopter landing pad shown in Figure 3;

Figure 7 shows third apparatus of the invention with an unpacked helicopter landing pad;

Figure 8 show fourth apparatus of the invention with an unpacked helicopter landing pad;

Figure 9 shows an electronic circuit for use with the apparatus of the invention;

Figure 10 is a perspective view showing the composition of a flexible strip of electroluminescent material; and

Figure 11 is a cross section through the flexible strip of electroluminescent material shown in Figure 10.

Referring to Figure 1, there is shown apparatus 2 for helping a helicopter to land. The apparatus 2 comprises a bag 4 containing a packed helicopter landing pad 6. The packed helicopter landing pad 6 is such that it is able to be unpacked on the ground to show a helicopter pilot where to land. The helicopter landing pad 6 is also such that it comprises a flexible strip of electroluminescent material 8 which become illuminated consequent upon receiving an electrical current from a power source in the form of two batteries 10 provided one in each of two battery pouches 12.

The apparatus 2 includes securing means in the form of a mallet 14 and pegs 16 for securing the

helicopter landing pad 6 to the ground during use of the apparatus 2.

The bag 4 shown in Figure 1 has a zip fastener which has been unzipped so that the inside of the bag 4 can be seen. In a lid part 18 of the bag 4, it will be seen that the mallet 14 is secured in position by having its handle 20 passed through a pair of loops 22 secured, for example by stitching, to the inside of the lid part 18 of the bag 4. The inside of the lid part 18 is also provided with two lines 24 of loops, with each loop in the lines 24 being for receiving a peg 16. The peg 16 may be in the form of a tent peg or any other type of peg. For ease of illustration, only two of the pegs 16 have been shown.

The bag 4 has a base part 26 with three releaseable retainer loops 28 as shown. The retainer loops 28 have interlocking plastics hook portions so that they can easily be undone and done up. The interlocking plastics hook portions may be those sold under the registered trade mark Velcro.

Each retainer loop 28 contains a strip 30 of a flexible support material, such for example as canvas or a plastics material. Mounted along the length of each strip 30 are two of the flexible strips of electroluminescent material 8 as shown.

When the strips 30 are rolled up, they are secured in position by the retainer loops 28. When the retainer loops 28 are undone, the strips 30 can be unrolled to form the unpacked helicopter landing pad 6. When the helicopter landing pad 6 is unpacked, the pegs 16 are able to pass through eyelets 32 in the strips 30 in order to retain the helicopter landing pad 6 firmly on the ground and such that the helicopter landing pad 6 does not get blown away by the air turbulence caused by a landing helicopter.

The two batteries 10 in the battery pouches 12 are electrically connected as shown schematically by a broken line 34. One of the battery pouches 12 also contains an inverter 36 as shown. Leads 38 run as shown from the inverter 36 to the three strips 30.

The base part 36 of the bag 2 is provided with a carrying handle 40 so that the apparatus 2 can easily be carried when the bag 4 is folded together and its zip is done up.

During use, the apparatus 2 shown in Figure 1 can be thrown from a helicopter wishing to land. Alternatively, the apparatus 2 can be transported to a landing site by a road vehicle such for example as a car, ambulance or motorbike. A person on the ground can then quickly unzip the bag 4 and unroll the packed helicopter landing pad 6 to the unpacked condition

shown in Figure 2. The flexible strips of electroluminescent material 8 will be illuminated and a helicopter pilot will easily be able to see where to land. The unpacked helicopter landing pad 6 will be of a size substantially the same as a known fixed helicopter landing pad. As shown in Figure 2, the strips 30 also include a T-shaped strip of reflective material 42 for helping to improve pilot visibility. Pull straps 44 are provided for helping to unroll the packed strips 30. The strips 30 are in the form of webbing which may be three inches (7.62 centimetres) wide.

In subsequent Figures, similar parts as in Figures 1 and 2 have been given the same reference numerals for ease of comparison and understanding.

In Figure 3, there is shown apparatus 2 with an unpacked helicopter landing pad 6 in the form of a letter H. The pegs 16 are in the form of spikes.

Figures 4, 5 and 6 show by the arrows how the unfolded helicopter landing pad 6 is to be folded up in order to be repacked. Figure 4 shows the first stage in which the helicopter landing pad 6 is folded in half. Figure 5 shows the second stage in which two parts of the folded helicopter landing pad 6 from Figure 4 are rolled inwards as shown. Figure 6 shows

the third stage in which the final part is rolled inwards as shown.

Figure 7 shows apparatus 2 with an unfolded landing pad 6 in the shape of a letter X.

Figure 8 shows apparatus 2 with an unfolded landing pad 6 which makes a diamond shape.

Referring now to Figure 9, there is shown an electrical circuit 46 which is a low power electrical circuit 46 and which is employed for providing electricity as required to the various strips of electroluminescent material 8. The circuit 46 comprises resistors R1, R2, R4, R5 and R6, capacitors C1, C2, C3 and C4, transistors T1 and T2, and a transformer TF1. An on/off switch 48 is formed by a pair of contacts 50. The capacitors C2 and C4 and the resistor R4 form an oscillator circuit which is completed by the primary of the transformer TF1. The primary of the transformer TF1 is driven by transistor T2. Power for the circuit 78 comes from the batteries 10 shown in previous Figures.

The circuit 46 operates such that the inverter 36 is kept in the off position by the resistor R6 which ensures that the transistor T1 is normally in the off condition. When the contacts 50 are made, then the transistor T1 is switched on. The transistor T1 then fires, through the resistor R1, the oscillator circuit

formed by the capacitors C1, C2 and the resistor R4. The primary of the transformer TF1 completes the oscillator circuit. The primary of the transformer TF1 is driven by the transistor T2 as shown. The completed oscillator circuit is tuned to capacitor C2. The capacitor C4 removes ripples in the direct current. The capacitor C3 matches the capacitance required for the electroluminescent material and stops the circuit 46 from generating high off load voltages. The resistor R5 adjusts the current required. By using the centre tap to feed back, it is able to create effectively 9v-0-9v with a 9 volt battery.

The flexible strips of electroluminescent material 8 illuminate when powered by the alternating current from the inverter 36. The illumination is a continuous illumination but a pulsating illumination can easily be achieved if desired, for example by modifying the circuit 46 to include a timer device.

As shown in Figures 10 and 11, the various flexible strips of electroluminescent material 8 are of substantially circular cross sectional shape. Each strip of electroluminescent material 8 comprises a first electrode 52 which is made of copper and which is a centrally positioned longitudinally extending electrode as shown. The strip of electroluminescent material 8 includes a second electrode 54 which is a

fine wire helically wound electrode. The first and the second electrodes 52, 54 are separated by a layer 56 which is made up of a phosphor coating with a minute metallic sheet. The assembly of the first and the second electrodes 52, 54 and the layer 56 is surrounded by a layer 58 which is an indium tin oxide layer. An outer layer 60 forms an outer protective sheath. The layer 60 is made of a polyvinyl chloride plastics material. Other plastics materials may be employed if desired.

The apparatus of the present invention can be easily stowed and carried, and it does not require mains power. The helicopter landing pad can conform to any recognised or required shape and size. The use of the helicopter landing pad provides better emergency landing visibility for a pilot of a helicopter than has been previously been provided by improvised lights such as car headlights, fires, torches or flares. The helicopter landing pad can be used by organisations and private individuals.

It is to be appreciated that the embodiments of the invention described above with reference to the accompanying drawings have been given by way of example only and that modifications may be effected. Thus, for example, helicopter landing pad signs other than those shown in the drawings may be formed.

CLAIMS

1. Apparatus for helping a helicopter to land, which apparatus comprises a bag containing a packed helicopter landing pad, the packed helicopter landing pad being such that it is able to be unpacked on the ground to show a helicopter pilot where to land, and the helicopter landing pad being such that it comprises a flexible strip of electroluminescent material which becomes illuminated consequent upon receiving an electrical current from a power source thereby to enable the helicopter pilot to see the helicopter landing pad in conditions of poor visibility.
2. Apparatus according to claim 1 and including securing means for securing the helicopter landing pad to the ground during use of the apparatus.
3. Apparatus according to claim 2 in which the securing means is a mallet and pegs.
4. Apparatus according to any one of the preceding claims in which the flexible strip of electroluminescent material is of substantially circular cross sectional shape.

5. Apparatus according to any one of the preceding claims in which the flexible strip of electroluminescent material comprises a first electrode which is a centrally positioned longitudinally extending electrode, and a second electrode which is a helically wound electrode.

6. Apparatus according to claim 5 in which the first and the second electrodes are separated by a phosphor coating with a metallic sheath.

7. Apparatus according to claim 5 or claim 6 in which the second electrode is surrounded by a sheath of an indium tin oxide.

8. Apparatus according to any one of claims 5 - 7 in which the flexible strip of electroluminescent material comprises an outer plastics layer.

9. Apparatus according to claim 8 in which the outer plastics layer is made of polyvinyl chloride.

10. Apparatus according to any one of the preceding claims and including an electronic circuit for causing

the strip of electroluminescent material to emit a continuous light.

11. Apparatus according to any one of claims 1 - 9 and including an electronic circuit for causing the strip of electroluminescent material to emit a pulsating light.

12. Apparatus according to claim 11 in which the electronic circuit includes timer means for causing the pulsating light.

13. Apparatus according to any one of the preceding claims in which the power source is at least one battery, and in which the apparatus includes an inverter for providing power for the electroluminescent material from the battery.

14. Apparatus according to any one of the preceding claims in which the strip of electroluminescent material extends the entire length and width of the helicopter landing pad.

15. Apparatus according to any one of the preceding claims in which the strip of electroluminescent

material is in the shape of a known helicopter landing pad sign.

16. Apparatus according to claim 15 in which the helicopter landing pad sign is a T, H, X or diamond shaped sign.

17. Apparatus according to any one of the preceding claims in which the helicopter landing pad is in roll form in its packed condition.

18. Apparatus according to any one of claims 1 - 16 in which the helicopter landing pad is in folded form in its packed condition.

19. Apparatus according to any one of the preceding claims in which the flexible strip is mounted on a flexible substrate material.

20. Apparatus according to claim 19 in which the flexible substrate material is a canvas or a plastics material.

21. Apparatus according to any one of the preceding claims in which the bag comprises a body portion for

the helicopter landing pad and a carrying portion by which the bag is carried.

22. Apparatus according to any one of the preceding claims and including a battery pouch for the power source in the form of a battery or batteries.

23. Apparatus according to claim 2 in which the battery pouch is formed as an integral part of the inside of the body portion of the bag.

24. Apparatus according to any one of the preceding claims in which the bag is in the form of a holdall.

25. Apparatus for helping a helicopter to land, substantially as herein described with reference to the accompanying drawings.

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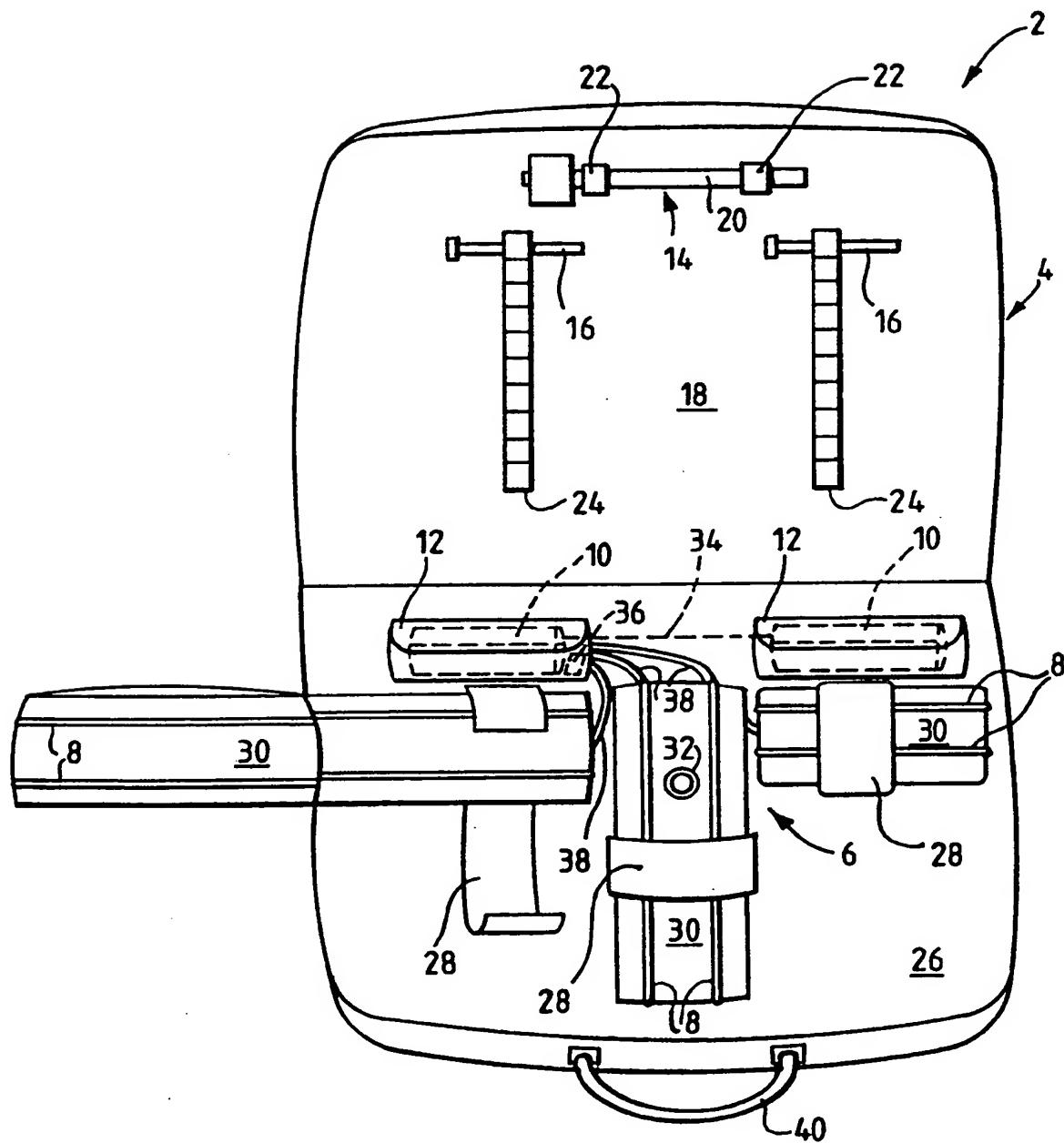


Fig.1.

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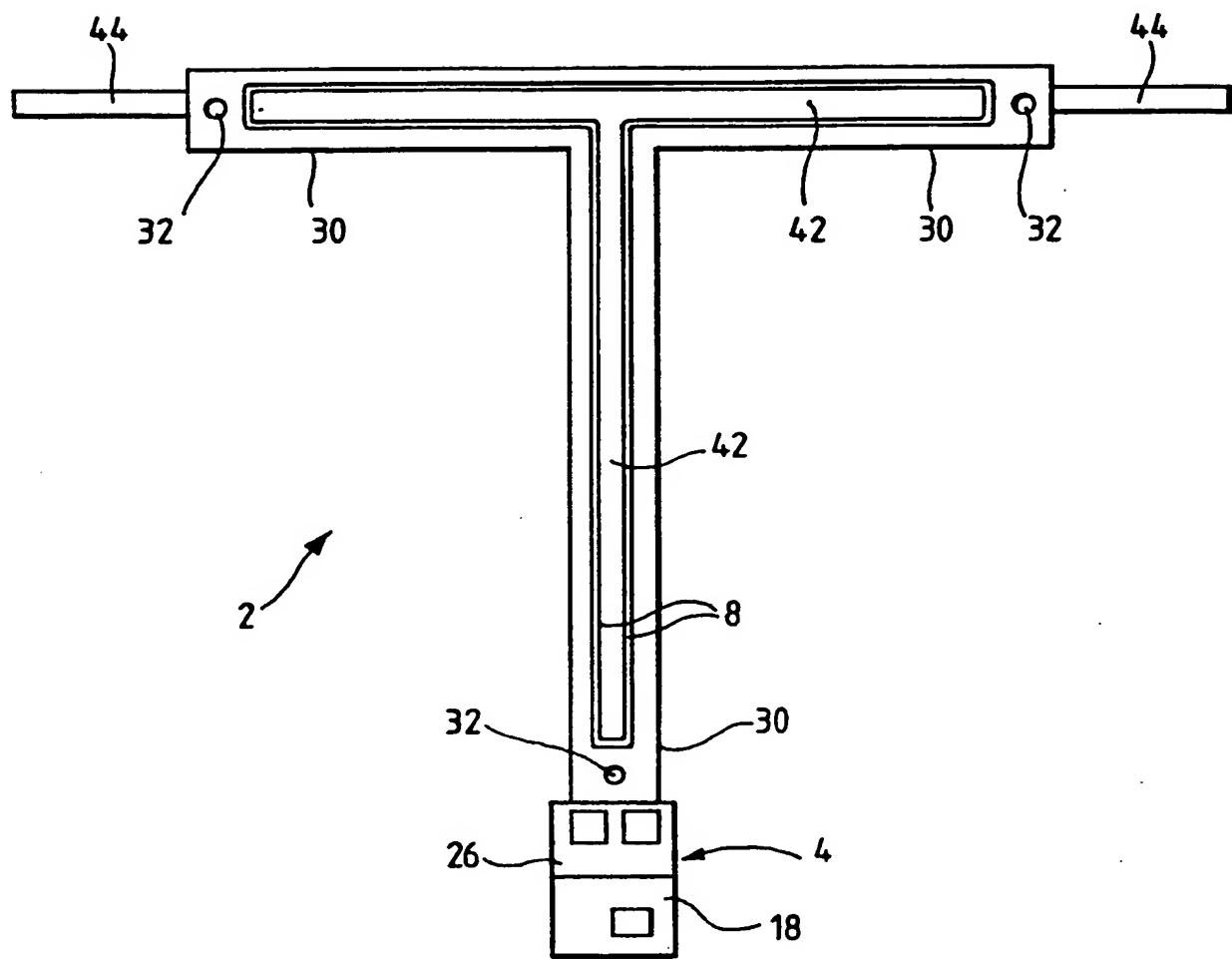


Fig.2.

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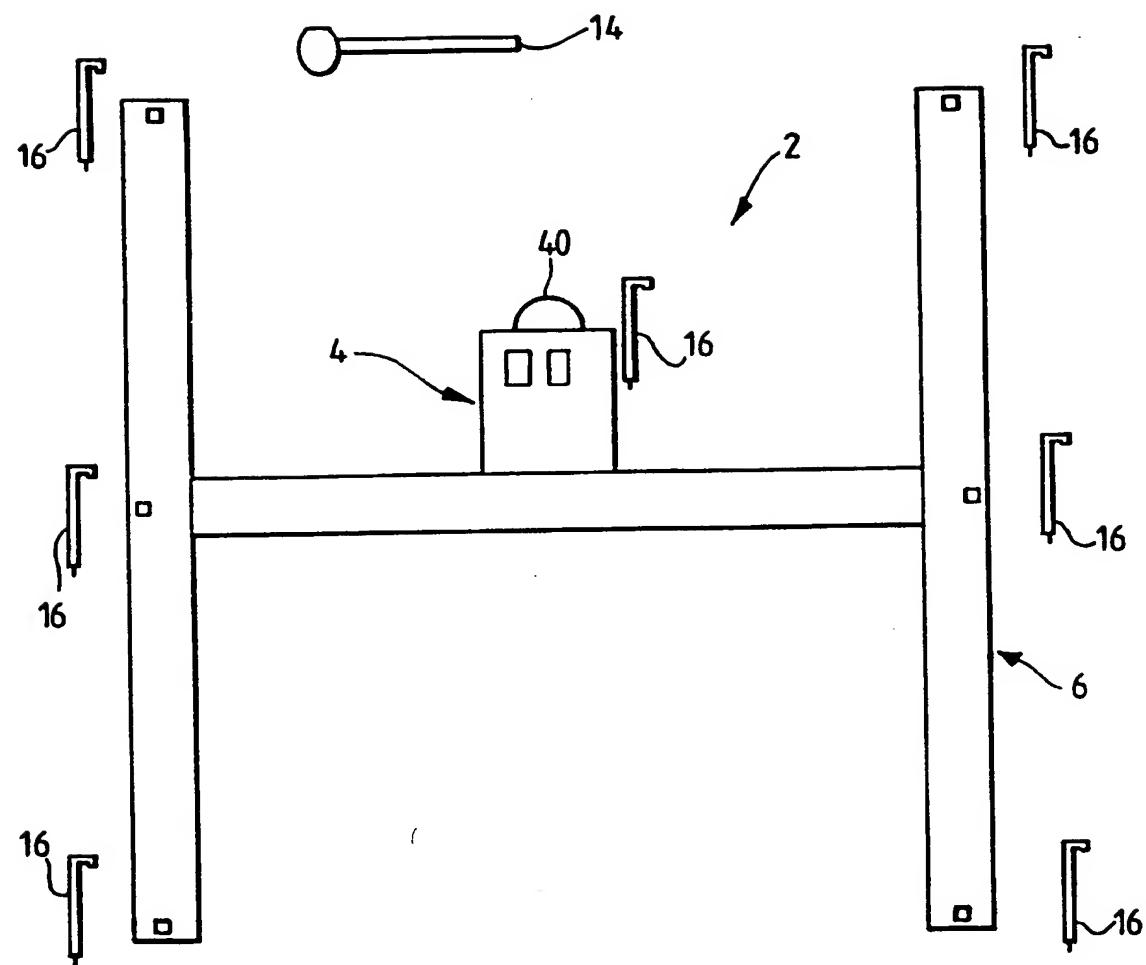


Fig.3.

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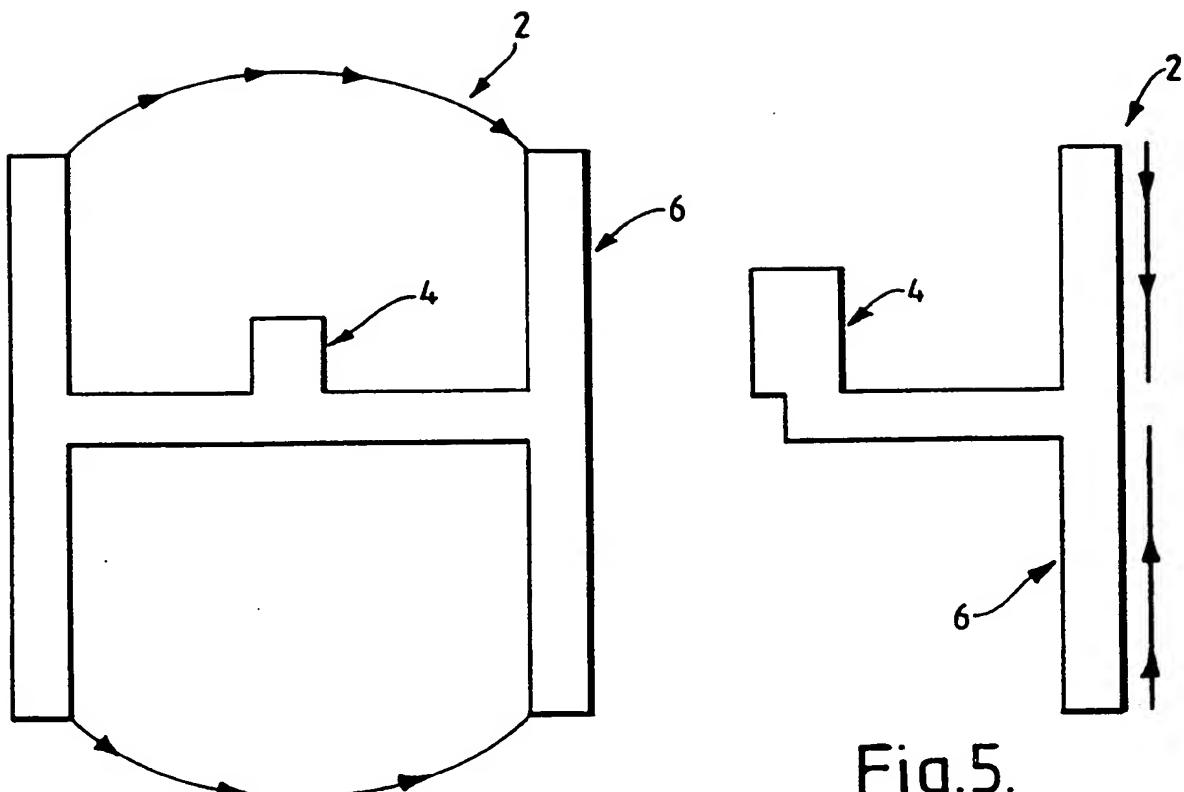


Fig.4.

Fig.5.

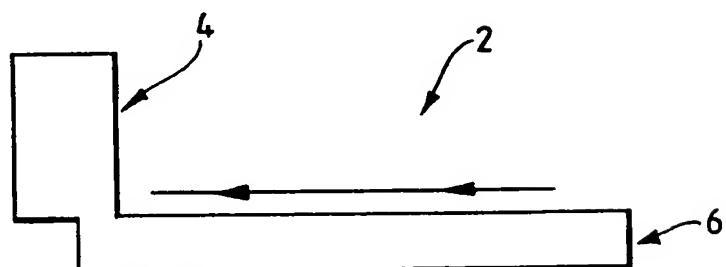


Fig.6.

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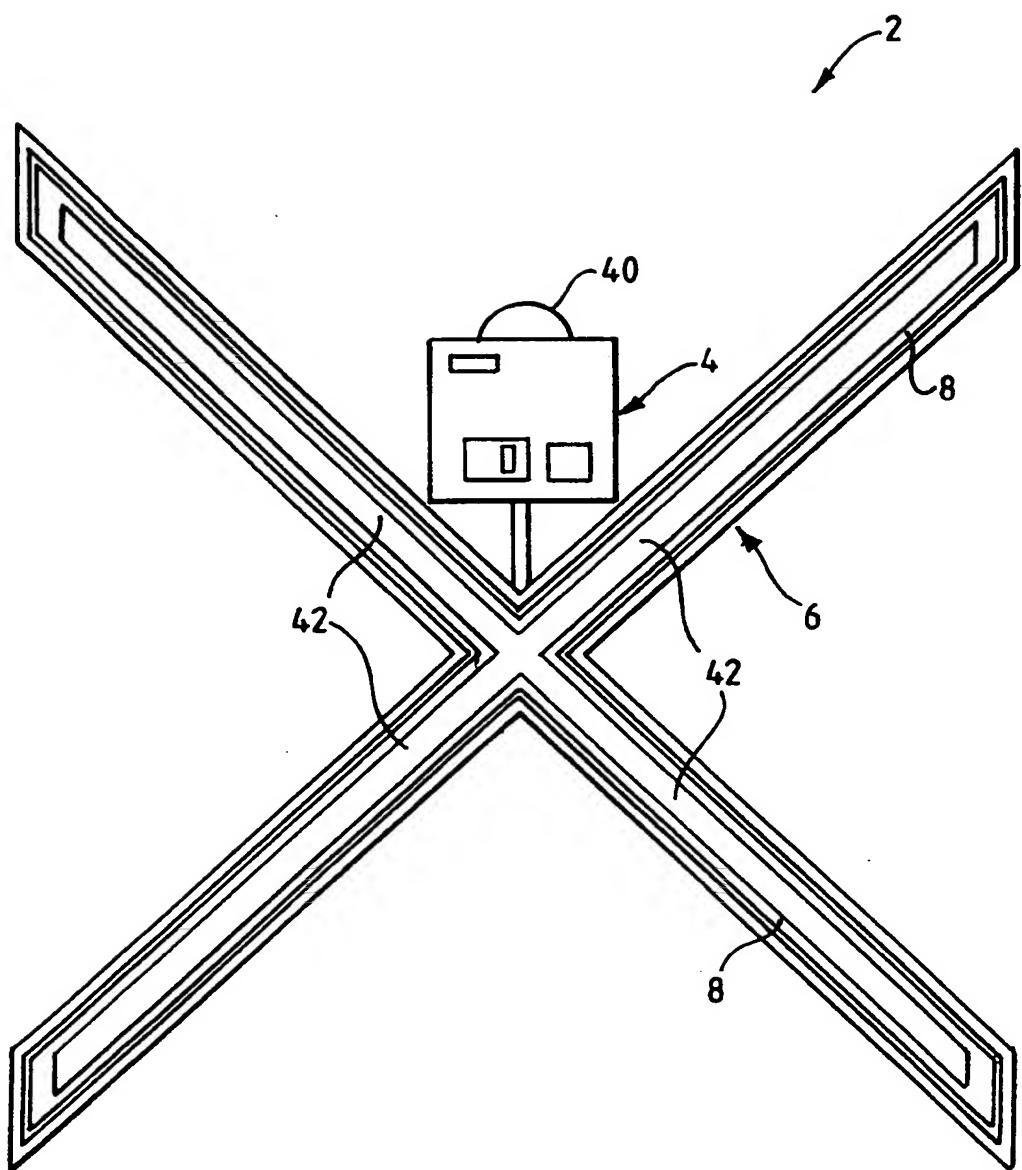


Fig.7.

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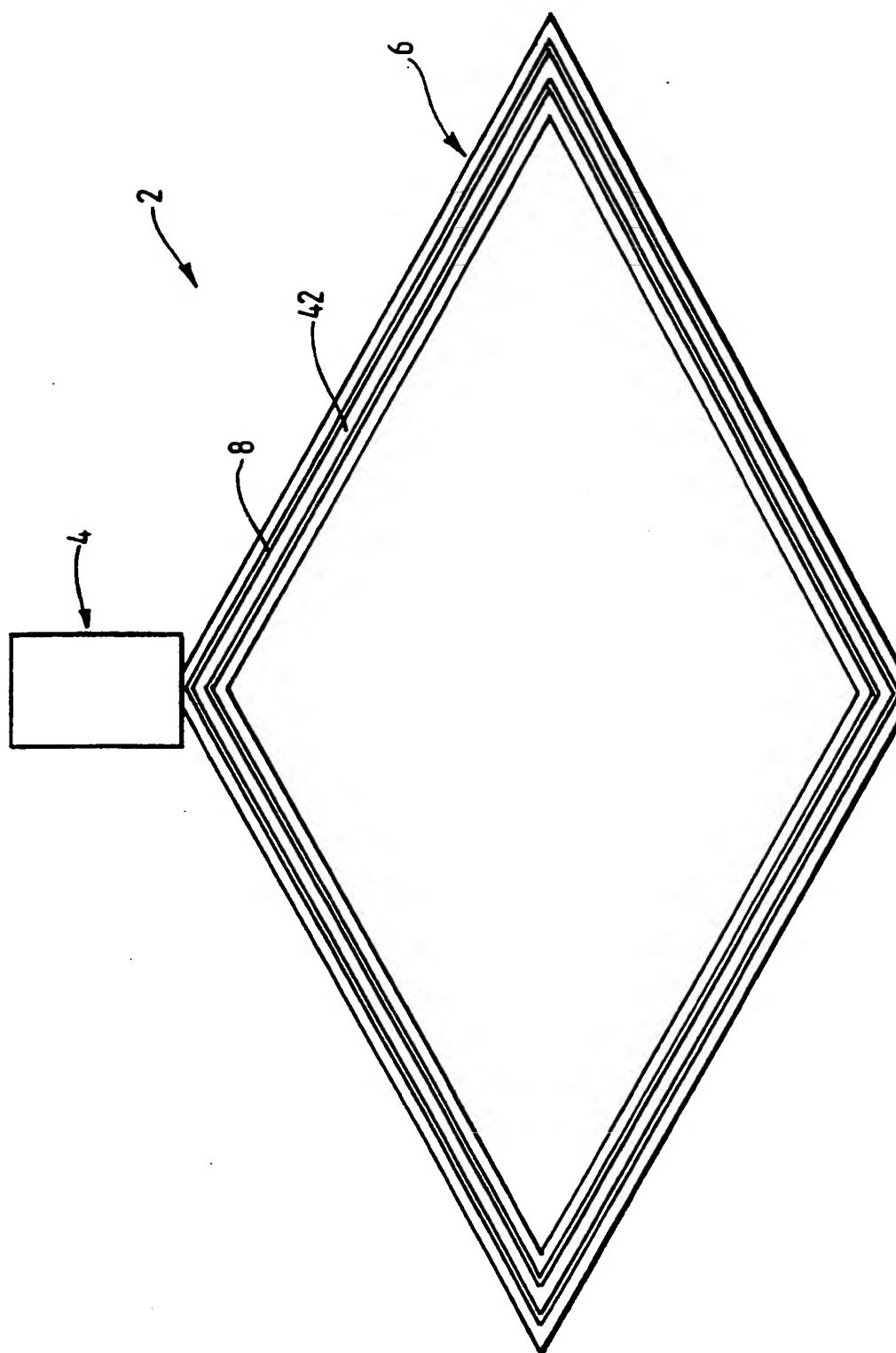
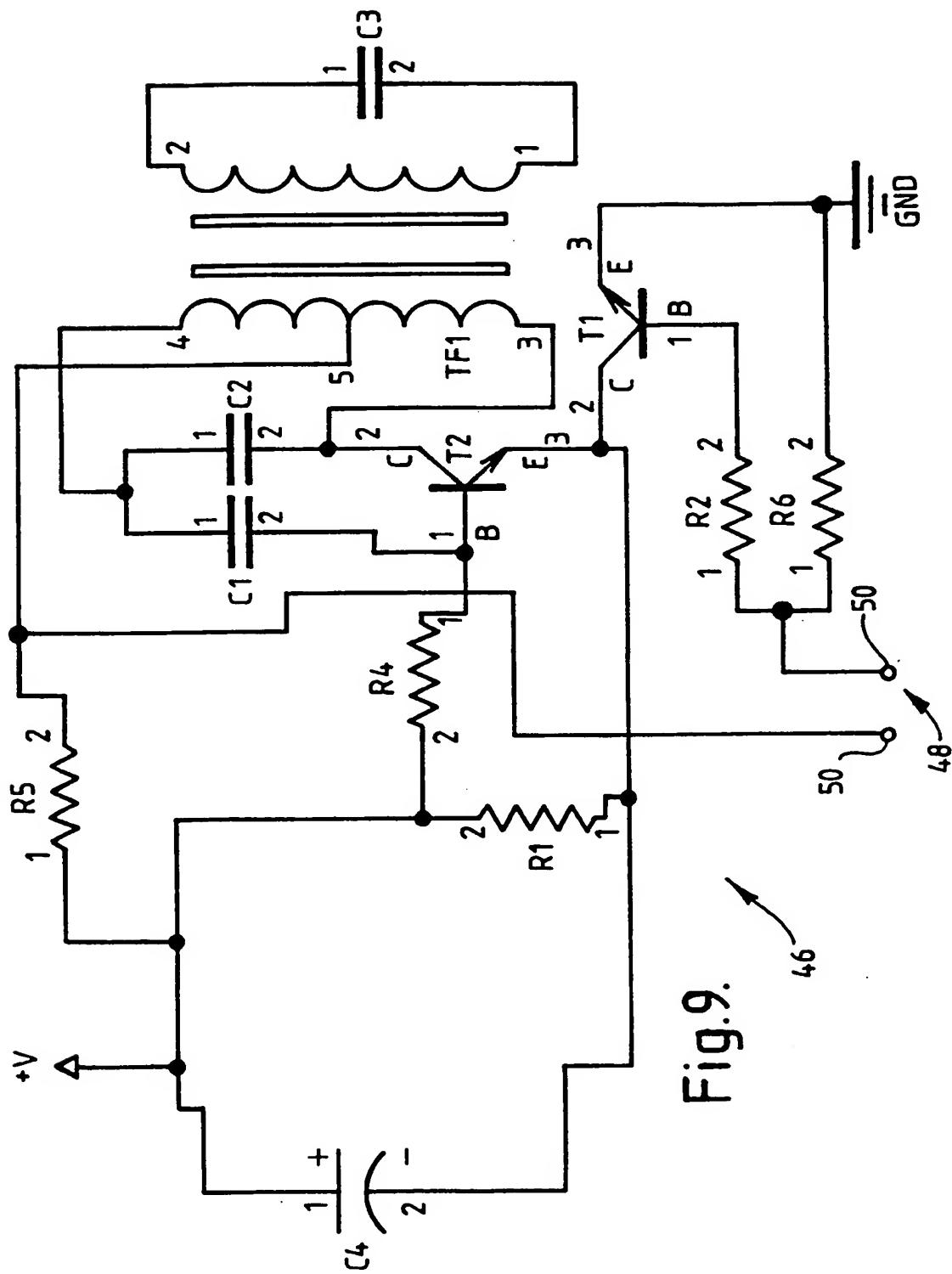


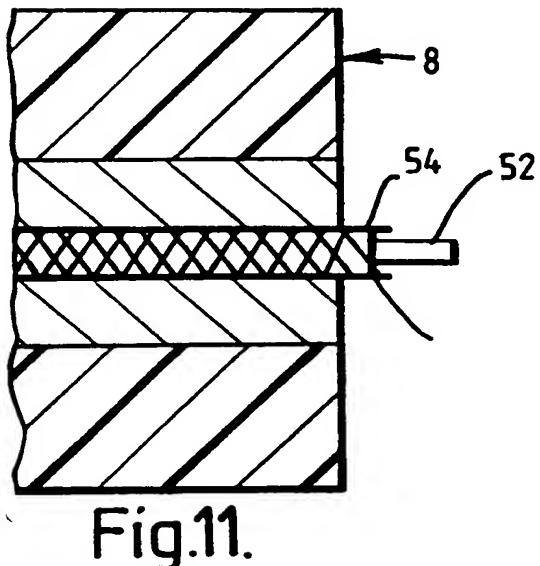
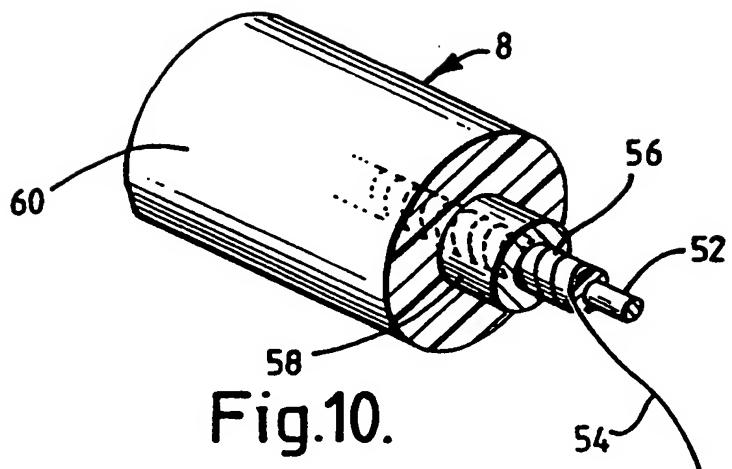
Fig.8.

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# INTERNATIONAL SEARCH REPORT

Intern. Application No

PCT/GB 98/00816

**A. CLASSIFICATION OF SUBJECT MATTER**  
 IPC 6 B64F1/20 H05B33/00

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)  
 IPC 6 B64F H05B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

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X	EP 0 648 898 A (BROSCH WALPURGA MAG) 19 April 1995 see abstract see column 1, line 44 - column 2, line 20 see column 2, line 30 - column 3, line 1 see column 3, line 12 - line 36 see column 3, line 58 - column 4, line 6 see figures 1-3 --- EP 0 481 840 A (ROUENNAISE DE BACHERIE ET CORD) 22 April 1992 see abstract see column 1, line 31 - line 51 see column 4, line 43 - column 5, line 38 see figures 1-3 --- -/--	1-25
A		1-3, 17-21, 24,25

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Date of the actual completion of the international search	Date of mailing of the international search report
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## INTERNATIONAL SEARCH REPORT

Int'l. Appl. No.

PCT/GB 98/00816

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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